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KOKAI PATENT APPLICATION NO. HEI 2[1990]-282261

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TRANSFER IMAGE FORMATION METHOD

Inventors:	Kunio Shimizu Konica Corp. 1 Sakura-cho Hino-shi, Tokyo-to
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Nobumasa Sasaki
Konica Corp.
1 Sakura-cho
Hino-shi, Tokyo-to

Manabu Watabe
Konica Corp.
1 Sakura-cho
Hino-shi, Tokyo-to

Toshiyoshi Urano
General Research
Institute
Mitsubishi Kasei Corp.
1000 Kamoshida-cho,
Midori-ku
Yokohama-shi,
Kanagawa-ken

Sinya Mayama
General Research
Institute
Mitsubishi Kasei Corp.
1000 Kamoshida-cho,
Midori-ku
Yokohama-shi,
Kanagawa-ken

Tetsuya Masuda
General Research
Institute
Mitsubishi Kasei Corp.
1000 Kamoshida-cho,
Midori-ku
Yokohama-shi,
Kanagawa-ken

Applicants:

Konica Corp.
1-26-2 Nishishinjuku
Shinjuku-ku, Tokyo

Mitsubishi Kasei Corp.
2-5-2 Marunouchi
Chiyoda-ku, Tokyo

Agent:

Tohru Takatsuki,
patent attorney

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Claims

1. A photosensitive material containing the following components (A)-(E) on a release-treated substrate, exposed under a positive original, [after which] the exposed area becomes soluble in an alkaline developer solution; in the transfer image formation method of the present invention, crosslinking or polymerization is carried out for compound (E) shown below and the exposure is made so that the insoluble portion is kept intact; the exposed area is removed by washing with an alkaline developer solution to produce the color image, and the said color image alone is transferred to the transfer object to produce the transfer image.

(A) Colorants

(B) A compound containing at least one C-O-C bond capable of acid cleavage

(C) A compound capable of forming a strong acid at the time of exposure

(D) A binder that is not soluble in water, but is soluble in an alkaline solution

(E) A compound containing at least an olefinic double bond capable of polymerization or photocrosslinking.

2. A transfer image formation method in which a photosensitive material containing the following components (A)-(E) on a release-treated substrate is exposed under a negative original until the exposed area becomes insoluble by crosslinking or polymerization of compound (E) shown below; where exposure of the above-mentioned photosensitive material is made without the original, crosslinking or polymerization of compound (E) is carried out to prevent the noncrosslinked area of the photosensitive material from becoming soluble in the alkaline developer solution, then the soluble area of the photosensitive material is washed off with an alkaline developer solution to produce a color image, and the color image alone is transferred to the transfer object to produce the transfer image.

(A) Colorants

(B) A compound containing at least one C-O-C bond capable of acid cleavage

(C) A compound capable of forming a strong acid at the time of exposure

(D) A binder that is not soluble in water, but is soluble in an alkaline solution

(E) A compound containing at least an olefinic double bond capable of undergoing polymerization or photocrosslinking.

Detailed explanation of the invention

Industrial application field

The present invention pertains to a transfer image formation method. The present invention can be applied to, for example, a method of image formation for color proofing in color printing.

Prior art

In the conventional transfer image formation method, it is possible to produce either a positive transfer image of the original (original) [sic] or negative transfer image of the original. It has not been possible to produce, selectively, either a positive image or negative image.

However, in some cases, a positive transfer image is desired, and in other cases a negative transfer image is desired from the same original. Therefore, development of a transfer image formation method wherein either a positive image or a negative image can be produced from an original, as desired, is in demand.

In the field of transfer process technology, for example, development of a method wherein negative processing is performed for a copy material having a positive effect is being developed, and for example, a reversal method wherein a negative copy is produced from a standard photosensitive material with positive effect is disclosed in Japanese Kokai Patent Application No. Sho 60[1985]-39641. However, the above-mentioned conventional method requires a heat treatment at approximately 110-150°C, and

it is less likely to be applied to transfer image formation technology. In other words, when a high-temperature heat treatment is used in the transfer image formation technology, expansion or deformation of the photosensitive material itself occurs due to the heat, which leads to dimensional distortion of the transfer image.

The above-mentioned dimensional distortion is a significant problem when used for color proofing. The reason is that it leads to [differing] dimensional distortion among the multiple color images.

Purpose of the invention

The present invention aims to eliminate the above-mentioned problems and provides a transfer image formation method that does not require high heat and is capable of producing a negative or positive transfer image, as desired; that is, it is capable of producing a negative image with a standard positive photosensitive material.

Configuration and function of the invention

To achieve the above-mentioned objective, when a photosensitive material containing following the components (A)-(E) on a release-treated substrate is exposed under a positive original, the exposed area becomes soluble in an alkaline developer solution in the transfer image formation method of the present invention, but in the transfer image formation method of the present invention described in Claim 1, crosslinking or

polymerization is performed for compound (E) shown below and the exposure is performed in such a manner that the insoluble portion is kept intact; then, the exposed area is removed by washing with an alkaline developer solution to produce a color image, and the said color image alone is transferred to the transfer object to produce a transfer image.

(A) Colorants

(B) A compound containing at least one C-O-C bond capable of acid cleavage

(C) A compound capable of forming a strong acid at the time of exposure

(D) A binder that is not soluble in water, but is soluble in an alkaline solution

(E) A compound containing at least one olefinic double bond capable of polymerization or photocrosslinking.

According to the above-mentioned invention, it is possible to produce a positive transfer image from a positive original.

Also, in the transfer image formation method described in Claim 2 of the present invention, a photosensitive material containing the above-mentioned components (A)-(E) on a release-treated substrate is exposed under a negative original until the exposed area becomes insoluble as a result of crosslinking or polymerization of compound (E) shown below. Exposure is performed for the above-mentioned photosensitive material without the original as crosslinking or polymerization of compound (E) is performed to prevent the noncrosslinked area of the photosensitive material from becoming soluble in the alkaline developer solution. Then, the solubilized area of the photosensitive material is washed off with an alkaline developer

solution to produce a color image, and the color image alone is transferred to the transfer object to produce a transfer image.

According to the present invention, it is possible to produce a negative transfer image from a negative original.

For example, when a positive transfer image is produced from a certain positive original according to the first invention of the present invention, and a negative transfer image is produced from the negative of the same original according to the second invention of the present invention, a positive image of the original can be produced as a result.

Also, when a positive transfer image is produced from the same positive original according to the first invention of the present invention, and when a negative transfer image is produced using the same original as a negative original according to the second invention of the present invention, either a positive or negative transfer image can be produced, selectively, from the same original.

As explained above, when each of the inventions described in the present application is used, the desired type of transfer image can be produced.

Furthermore, neither invention requires heating, and formation of dimensional distortion is less likely to occur.

In the following, each invention described in the present application is explained in detail.

First, the invention described in Claim 1 of the present application is explained below.

The photosensitive material used in the present invention has the above-mentioned components (A)-(E) (hereinafter

"photosensitive material of the present invention", etc., at times) on a release-treated substrate.

In the present invention, the substrate used for the photosensitive material of the present invention is not limited, and a transparent substrate can be used effectively. For the transparent substrate, polyethylene film, particularly biaxially drawn polyethylene terephthalate, is desirable from the standpoint of dimensional stability with regard to moisture and heat. In addition, acetate films, polyvinyl chloride films, polyethylene films, polypropylene films, polyethylene films, etc., can be used effectively.

The substrate comprised of the photosensitive material is a release-treated substrate. The release-treated substrate is a substrate which provides releasing properties between the substrate and image forming layer (colored photosensitive layer) by applying a releasing treatment on the surface of the substrate or providing a releasing layer on the surface of the substrate.

In other words, in the transfer image formation method of the present invention, the color image alone is transferred to the transfer object, and a transfer image is produced, and when said method is specifically used as a multicolor image transfer method, the basic process can be roughly divided into the following methods (I) and (II).

(I) The first color image forming material having a color image forming layer for the first color on the substrate is arranged on the transfer object, the color image forming layer is transferred to the transfer object, and the substrate is removed. Then, an image exposure is made through the first color film which corresponds to the first color, a development process is

subsequently performed, and the first color image is produced on the transfer object.

Then, at least the color image forming layer of the second color image forming material which contains the second color image forming layer, which is different in color from the first color, is transferred onto the first color image forming layer of the above-mentioned transfer object, the positioning images of the second color film original that correspond to the second color (in general, referred to as registration marks) are matched with the first registration marks; then, an image exposure is made through the second color film original, development processing is performed, and a matching image of two colors are produced on the transfer object. In the same manner, the third and fourth colors are processed and a multicolor image is produced.

It should be noted that the above-mentioned method is disclosed in Japanese Kokoku Patent No. Sho 47[1972]-27441, and Japanese Tokuhyo Patent Application No. Sho 56[1981]-501217, etc.

(II) The first color image is produced on the first color image forming material, and at least the colored image is transferred to the transfer object, and the substrate is removed. Also, the second color image is produced on the second color image forming material. Then, the second color image is produced on the first color image while the second color image is positioned according to the registration marks produced according to the registration marks of the first color image; the substrate is removed, and an image with a two color matched image is produced. In the same manner, the third color and fourth color are processed, and a multicolor image is produced. Also, the

above-mentioned multicolor image is indirectly transferred to a different transfer object, and a multicolor image is produced, in some cases.

It should be noted that the above-mentioned method is disclosed in Japanese Kokai Patent Application Nos. Sho 47[1971]-41830, Sho 59[1984]-97140, and Sho 60[1985]-28649 and United States Patent No. 3,775,113.

In the transfer image formation method of the present invention, in general, the image exposure is performed through a color separation mask, etc., and development is performed for the image forming material, and an image is produced. In this case, the image part alone of the image produced on the substrate is directly transferred to the transfer object and laminated. That is, in a practical sense only the color image layer that forms the image is transferred and laminated. In the present invention, a release-treated substrate is used, transfer to the transfer object can be done efficiently, and release from the substrate after the image transfer process can be accomplished easily. In order to produce a release-treated substrate, a release treatment using an appropriate type of oil-repellent substance is carried out for the surface of the substrate, or a release layer is deposited on the surface of the substrate.

For the above-mentioned oil-repellent materials, for example, silicone resins, fluoro resins, fluorine surfactants, polyolefins, polyamide, etc., can be used. For the release layer, for example, an alcohol-soluble polyamide, alcohol-soluble nylons, a blended material of partially esterified resins of copolymers of styrene and maleic anhydride and a methoxymethylated nylon, polyvinyl acetate, polyacrylate, a

copolymer of polymethyl methacrylate and acrylate, polyvinyl chloride, a copolymer of polyvinyl chloride and vinyl acetate, polyvinyl butyrate, cellulose acetate phthalate, methylcellulose, ethylcellulose, cellulose diacetate, cellulose triacetate, polyvinyl alcohol, butylcellulose, hydroxyethylcellulose, carboxymethylcellulose, cyanoethylcellulose, cellulose acetate, cellulose triacetate, cellulose acetate butyrate, hydroxypropyl methylcellulose phthalate, hydroxypropyl methylcellulose hexahydrophthalate, as well as mixtures thereof, etc., can be used.

The thickness of the release layer is preferably in the range of 0.01-10 μm , and a range of 0.1-5 μm is especially desirable.

In order to increase the release properties, as a suitable configuration, an example wherein a polypropylene layer or polyethylene layer having a thickness less than the thickness of the substrate can be mentioned.

As a method used for forming a polypropylene layer or polyethylene layer on the substrate, the following can be mentioned:

(1) The so-called dry laminate method in which a solution produced by dissolving polyvinyl acetate, polyvinyl chloride, epoxy resin, polyurethane resin, natural rubber, or synthetic rubber in an organic solvent is used as an adhesive; the above-mentioned adhesive is coated onto the substrate, dried by hot air or upon heating, a polypropylene film or polyethylene film is placed on it, pressure is applied under heat, and lamination is performed.

(2) The so-called hot-melt lamination method, in which a copolymer of ethylene and vinyl acetate, a copolymer of ethylene and acrylic acid ester, polyamide resin, petroleum resin, rosin resin, waxes, or mixture thereof is used as an adhesive, and the adhesive is coated under heat in a hot-melt state using a devices such as a doctor blade, roll coater, gravure [coater], or reverse-roll [coater]. The adhesive is bonded immediately with the polypropylene film or polyethylene film, heat treatment is performed at a high temperature as needed, and it is cooled and then laminated.

(3) The so-called lamination method, in which polypropylene or polyethylene is retained in a molten state, extruded from an extruder in the form of a film, and the substrate is applied with pressure while still in a molten state.

(4) The so-called coextrusion method, in which multiple extruders are used when the film that forms a substrate is produced by hot-melt extrusion and polypropylene or polyethylene in a molten state is deposited onto the substrate to form a polypropylene layer or polyethylene layer in a single process, etc.

In the following, each of components (A)-(E) included in the photosensitive material of the present invention is explained.

First, colorant (A) is explained.

For the colorant, dyes and pigments can be mentioned. In particular, when used for color proofing, matching pigments or dyes required for the proofing, that is, those matching the yellow, magenta, cyan, and black are required. In addition, metal powders, white pigments, fluorescent pigments, etc., can be used as well. When the present invention is used for the

transfer image formation method for color proofing, a variety of pigments and dyes commonly known in the technical field and which are listed below can be used freely.

(C.I. is color index.)

Victoria Pure Blue (C.I. 42595)

Auramine (C.I. 41000)

Cation Brilliant Flavin (C.I. basic 13)

Rhodamine 6GCP (C.I. 45160)

Rhodamine B (C.I. 45170)

Safranine OK 70:100 (C.I. 50240)

Erioglaucine X (C.I. 42080)

Fast Black HB (C.I. 26150)

No. 1201 Lionol Yellow (C.I. 21090)

Lionol Yellow GRO (C.I. 21090)

Thymol Fast Yellow 8 GF (C.I. 21105)

Benzene Yellow 4T-564D (C.I. 21095)

Thymol Fast Red 4015 (C.I. 12355)

Lionol Red 7 B4401 (C.I. 15830)

Fastogen Blue TGR-L (C.I. 74160)

Lionol Blue SM (C.I. 26150)

Mitsubishi Carbon Black MA-100

Mitsubishi Carbon Black #30, #40, #50

In the present invention, for the amount of the colorant used, for example, when it is used in the form of a color photosensitive layer, the colorant/binder ratio is determined by methods known to those familiar with the field while taking the target optical density and the removal ratio of the color photosensitive layer for the developer solution into account. For example, for the dye, the amount included is preferably a

weight ratio of 5-75%, and for the pigment, the amount included is preferably a weight ratio of 5-90%.

Furthermore, the film thickness of the color photosensitive layer can be determined by those familiar with the field according to the target optical density, type of the colorant (dyes, pigment, carbon black), and the amount included in the color photosensitive layer, but the resolution is higher when the film thickness in the color photosensitive layer is lower within the allowable range, and the image quality is good. For this reason, in general, the film thickness used is preferably in the range of 0.1-5 g/m².

In the following, the compound having at least one C-O-C bond capable of forming an acid cleavage (B), included in the photosensitive material of the present invention, [is explained].

For the above-mentioned compound (B), for example, compounds (B-1)-(B-3) described below can be mentioned.

(B-1) is compound having at least one orthocarboxylic acid ester group and/or carboxamide acetal group. It can be a polymer as well. Each group may exist in the form of a coupling group in the entire chain, or in the form of a substituent.

In specific terms, the compound of (B-1) is described in the specification of United States Patent No. 4,101,323 and the specification of European Patent Application No. 22571.

(B-2) is compound having a repeat acetal group and/or repeat ketal group in the main chain. A low molecular weight compound [can be used]; a high molecular weight compound can be used as well.

The compound of (B-2) is described, for example, in the specifications of West German Patent Nos. 2,306,248 and 2,718,254, as well as the specification of United States Patent No. 5,779,778.

(B-3) is compound containing at least one enol ether group or N-acyliminocarbonate group.

The compound of (B-3) is described, for example, in the specifications of European Patent Nos. 0006626 and 0006627.

The amount of the compound (B) included in the photosensitive material is freely selected to achieve the above-mentioned effect, but when the compound is included in the color photosensitive layer with colorant (A), binder, etc., it is appropriately selected from a range of 4-50 wt% for said layer, and a range of 5-30 wt% is especially desirable.

In the following, the compound capable of forming a strong acid at the time of exposure (C) is explained.

For the above-mentioned compound, a variety of known compounds or mixtures can be used. For example, phosphonium salts, sulfonium salts, iodonium salts, halogen compounds, or organic metal/organic halogen mixtures, etc., can be used effectively.

In general, phosphonium compounds, sulfonium compounds, and iodonium compounds can be used in a form of a soluble salt in an organic solvent, and in general, they can be used in the form of a precipitate with an acid capable of forming a complex ion such as hydroborofluoric acid, hexafluorophosphoric acid, and hexafluoroarsenic acid.

The photosensitive compound containing a halogen that forms a halogenated hydrogen acid as a strong acid can be any organic

halogen compound that can be used as an optochemical free radical initiator; for example, a compound having at least one halogen atom on the urea or aromatic ring can be mentioned.

Examples of above-mentioned compounds are described in the specifications of United States Patent Nos. 3,515,552, 3,536,489, and 3,779,778, specification of West German Patent No. 2,610,842, specifications of West German Patent Application Nos. 2,243,621, 2,718,259, and 3,337,024, etc. Among those included above, s-triazine derivatives having two halogenated methyl groups on a triazine nucleus, especially, those having a trichloromethyl group and aromatic or unsaturated substituents as described in the specifications of West German Patent Application Nos. 2,718,259 and 3,337,024 can be mentioned. In addition, 2-trichloromethyl-1,3,4-oxathiazole described in the specifications of West German Patent Application Nos. 2,851,471 and 2,949,396 can be mentioned. Furthermore, the effect of the above-mentioned compound containing halogen can be adjusted, and the properties can be increased by a conventional sensitizer.

For specific examples of the above-mentioned compounds, those listed below can be mentioned.

Thus, 4-methyl-6-trichloromethyl-2-pyrone, 4-(3,4,5-trimethoxystyryl)-6-trichloromethyl-2-pyrone, 4-(4-methoxystil)-6-(3,3,3-trichloropropenyl)-2-pyrone, 2-trichloromethylbenzimidazole, 2-tribromomethylquinoline, 2,4-dimethyl-1-tribromoacetylbenzene, 3-nitro-1-tribromoacetylbenzene, 4-bromoacetyl benzoate, 1,4-bisdibromomethylbenzene, trisdibromomethyl-s-triazine, 2-(6-methoxynaphth-2-yl)-, 2-(naphth-1-yl)-, 2-(naphth-2-yl)-, 2-(4-ethoxyethylnaphth-1-yl)-, 2-(benzopyran-2-yl)-,

2-(4-methoxycyantrac-1-yl)-, 2-(4-styryl phenyl)-, 2-(phenanthr-9-yl)-4,6-bistrichloromethyl-s-triazine, etc., can be mentioned.

The amount of compound (C) included in the photosensitive material can be freely selected according to the desired properties. For example, when the compound is included in the color photosensitive layer with colorant (A), binder, etc., it is appropriately selected from a range of approximately 0.5-20 wt% for the total solids included in the said layer, and a range of 1.0-12 wt% is especially desirable. When the compound is added to a photosensitive layer with a thickness that exceeds 0.01 mm, it is effective to use a relatively small amount of acid donor.

In the following, the binder that is not soluble in water, but soluble in an alkaline solution (D) (in the following, it is referred to as "an alkaline-soluble binder" in some cases) included in the photosensitive material of the present invention is explained.

In this case, "insoluble in water" means that the compound does not dissolve or expand in cold or warm water in the range of pH 6 to pH 8.

Also, "alkaline-soluble" means that the compound is at least soluble or expandable in an alkaline solution and can be removed.

For examples of resins suitable to comprise the alkaline-soluble binder used in the present invention, compounds having an alkaline-soluble group such as a phenolic hydroxy group, carboxyl group, sulfonic acid group, or phosphoric acid group can be mentioned. For examples of the above-mentioned alkaline-soluble resins, those produced by a condensation reaction of phenols and ketones or aldehydes in the presence of an acid catalyst [can be mentioned]. For examples of the

above-mentioned phenols, phenol, cresol, p-substituted phenol, etc., can be mentioned. For examples of above-mentioned aldehydes, acetaldehyde, formaldehyde, etc., can be mentioned, and formaldehyde is especially suitable. For the above-mentioned ketones, acetone is desirable.

For examples of resins suitable for the alkaline-soluble binder, specifically, phenol-formaldehyde resin, cresol-formaldehyde resin, phenol-cresol-formaldehyde condensation copolymer resin described in Japanese Kokai Patent Application No. Sho 55[1980]-57841, a condensation copolymer of p-substituted phenol and phenol, or cresol and formaldehyde described in Japanese Kokai Patent Application No. Sho 55[1980]-127553, resorcinol-benzaldehyde resin, a condensate of a polyhydric phenol such as pyrogallol-benzaldehyde resin, and benzaldehyde, condensation copolymer of a polyhydric phenol such as pyrogallol-resorcinol-acetone resin and acetone, xylynol-formaldehyde resin, etc., can be mentioned as suitable examples.

The amount of alkaline-soluble binder (D) included in the photosensitive material when the color photosensitive layer is produced by mixing the above-mentioned binder (D), colorant (A), or the above-mentioned compounds (B) and (C) is preferably in the range of 30-90 wt% for the total amount of solids that comprise the above-mentioned layer, and 50-85 parts by weight is especially desirable. The alkaline-soluble binder can be used in combination with various binders.

In the following, the compound containing at least an olefinic double bond capable of polymerization or photocrosslinking (E) is explained.

For suitable compounds that can be used for the above-mentioned compound, a compound having an olefinic double bond next to the CO group [can be mentioned]. For example, a compound known as chalcone can be used effectively. Bis- or trischalcone, azide chalcone, cinnamic acid derivatives, etc., can be used effectively for the photocrosslinking agent in the present invention. The above-mentioned photosensitive $-\text{CH}=\text{CH}-\text{CO}-$ group can be included in the main chain or the side chain of the polymer as described in the specifications of United States Patent Nos. 3,030,208, 3,707,373, and 3,453,237 and the specification of West German Patent Application No. 1,447,016.

The photopolymeric compound includes at least one, preferably, two or three terminal double bonds in the molecule, and undergoes polymerization upon application of radiation. For the above-mentioned compounds, acrylates and methacrylates of polyols, for example, diethylene glycol diacrylate, diethylene glycol dimethacrylate, triethylene glycol acrylate, triethylene glycol dimethacrylate, pentaerythritol triacrylate, pentaerythritol trimethacrylate, trimethylolpropane triacrylate, trimethylolpropane trimethacrylate, trimethylolethane triacrylate, and trimethylolethane trimethacrylate, etc., are described in the specifications of United States Patent Nos. 3,261,686 and 3,380,831 and the specification of British Patent 1,154,872.

The amount of compound (E) included in the photosensitive material can be appropriately selected, but when included in the color photosensitive layer, in general, the amount of the compound (E) is preferably in the range of 2-30 wt% for the nonvolatile component, and 4-20 wt% is especially desirable.

The ratio of the above-mentioned compound capable of acid cleavage (B) that functions as a positive, and the photopolymeric or photocrosslinkable compound (E) that functions as a negative (mixing ratio when used as a mixture) can be determined appropriately to achieve the desired effect. For example, in order to achieve photosolubilization in a short exposure time, and to achieve photocuring at an appropriate exposure time so that the desired effect can be achieved in all cases, it is necessary for the above-mentioned ratio to be in a constant range. In general, approximately 0.2-5 parts by weight of compound (E) are added for 1 part by weight of compound (B), and approximately 0.3-3 parts by weight is especially desirable. Also, the above-mentioned mixing ratio is not essential, and a ratio outside the above-mentioned range can be used effectively as long as the combination used is right.

It is not necessary to use an additional photopolymerization initiator for polymerization of the unsaturated compound in the photosensitive material containing compounds (B), (C), and (E).

Upon application of the present invention, the above-mentioned compounds (A)-(E) can be mixed and dispersed with a solvent (an organic solvent such as ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, methyl Cellosolve, ethyl Cellosolve, etc.), and can be used as a color photosensitive solution and coated onto a substrate to produce a color photosensitive layer. Thus, a photosensitive material can be produced.

Upon application of the present invention, plasticizers and coating coagents, etc., also can be included in the above-mentioned color photosensitive layer as needed.

For plasticizers, a variety of low molecular weight compounds, for example, phthalates, triphenyl phosphates, maleates, etc., can be mentioned. For coating coagents, surfactants, for example, fluorine surfactants, nonionic surfactants represented by ethylcellulose polyalkylene ether, etc., can be mentioned.

Upon application of the present invention, the photosensitive material of the present invention can be divided into two layers comprised of the color layer that includes the colorant (A) and binder (D), and the photosensitive layer that includes compounds (B), (C), (E), and (D). In this case, either layer can be placed next to the substrate.

Also, the area of the photosensitive material of the above-mentioned present invention exposed under a positive original becomes soluble in an alkaline developer solution, but in the invention described in Claim 1 of the present application, a crosslinking treatment or polymerization is performed for compound (E), and exposure is performed in such a manner that it remains insoluble.

Control of the exposure described above can be achieved through control of the intensity of the exposure light or exposure time. Needless to say, it also depends on the type or amount of the compound used.

Means used for exposure is not especially limited, and a variety of exposure light sources can be used.

Subsequently, in the present invention, the exposed area is washed off with an alkaline developer solution and removed to produce the color image, the color image produced is transferred alone to the transfer object, and a transfer image is produced.

For the developer solution that can be used for above-mentioned development process, any developing agent can be used as long as development can be performed for the transfer object. A developer solution containing an alkaline substance and an anionic surfactant is especially desirable.

For alkaline substances that can be used,

(1) inorganic alkaline substances such as sodium silicate, potassium silicate, potassium hydroxide, sodium hydroxide, lithium hydroxide, sodium di- or triphosphate, or sodium metasilicate, sodium carbonate, and ammonia,

(2) organic amine compounds such as mono-, di-, or trimethylamine, mono-, di-, or triethylamine, mono-, di-isopropylamine, n-butylamine, mono-, di-, or triethanolamine, mono-, di- or triisopropanolamine, ethylenimine, and ethylenediimine, can be mentioned.

Also, for examples of anionic surfactants that can be used in this case,

(1) higher alcohol sulfates (for example, sodium salt of lauryl alcohol sulfate, ammonium salt of octyl alcohol sulfate, ammonium salt of lauryl alcohol sulfate, disodium alkyl sulfate, etc.);

(2) salts of aliphatic alcohol phosphates (for example, sodium salt of cetyl alcohol phosphate, etc.);

(3) salts of alkylaryl sulfonates (for example, sodium salt of dodecylbenzene sulfonate, sodium salt of isopropyl-naphthalene sulfonate, sodium salt of binaphthalene sulfonate, sodium salt of m-nitrobenzene sulfonate, etc.);

(4) alkylamide sulfonates

(
$$\text{C}_n\text{H}_{2n+1}\text{CCN} - \underset{\text{CH}_3}{\underset{|}{\text{CH}}}\text{CH}_2\text{SO}_3\text{Na}, \text{ etc.})$$

(5) sulfonates of dibasic aliphatic esters (for example, sodium sulfosuccinate dioctyl ester, sodium sulfosuccinate dihexyl ester, etc.);

(6) formaldehyde condensates of alkyl naphthalene sulfonates (for example, formaldehyde condensate of dibutyl naphthalene sodium sulfonate, etc.) can be mentioned.

A desired combination of an alkaline substance and anionic surfactant can be freely used.

When above-mentioned transfer image formation method is used, an adjustment of resolution can be achieved by changing the exposure time, and [this] is convenient.

In the following, the second invention described in the Claim 2 of the present application is explained. In this invention, the above-mentioned photosensitive material of the present invention is exposed under the negative original until the exposed area becomes insoluble by performing crosslinking or polymerization of compound (E) shown below. Exposure is performed for the above-mentioned photosensitive material without the original as crosslinking or polymerization is performed for compound (E) to prevent the noncrosslinked area of the photosensitive material from becoming soluble in the alkaline developer solution. Then, the solubilized area of the photosensitive material is washed off with an alkaline developer solution to produce a color image, and the color image is

transferred alone to the transfer object to produce a transfer image.

In this invention, exposure is performed for the photosensitive material of the present invention under the negative original, and in this case, the exposure time is defined as the time required for compound (E) to become insoluble through crosslinking or polymerization. In general, it is desirable to provide an exposure of approximately 3-20 times that required for the positive under the same conditions, and a time corresponding to 4-15 times longer is especially desirable. However, an extended exposure time is not necessarily effective.

Then, after the above-mentioned exposure, the photosensitive material is exposed without the original to the point where the noncrosslinked area of the photosensitive material becomes soluble in an alkaline developer solution, but exposure is performed to the point where it does not become soluble by performing either a crosslinking treatment or polymerization reaction for compound (E), and for example, the above-mentioned object can be achieved by exposing two times for the duration of exposure required to achieve photosolubilization of the compound capable of acid cleavage (B). When above-mentioned method is used, the area that has been cured according to the image is further cured, but the development properties are not especially adversely influenced.

Subsequently, the soluble part of the photosensitive material is washed off with an alkaline developer solution and removed, and a color image is produced.

For the developer solution, those described for the invention of the Claim 1 can be used in this case as well.

Then, the color image produced above is transferred alone to the transfer object, and a transfer image is produced.

In this case, the above-mentioned configuration can be used as well.

In each invention of the present application, a variety of materials that correspond to the image desired to be produced can be used freely.

For example, in the case of a multicolor image, a color decomposition positive or negative of each color can be mentioned.

Application examples

In the following, application examples of the present invention are described.

Needless to say, the present invention is not limited to application examples shown below, and a variety of forms can be used as well.

Application Example 1

As a release-treated substrate, a laminate produced by laminating a polypropylene film (Trefan [transliteration] 3931, product of Toray Corp.) with a thickness of 30 μm on a polyethylene terephthalate film with a thickness of 75 μm by a dry lamination process was used. A color photosensitive dispersion with the composition shown below was coated onto the surface of the polypropylene film on the substrate using a wire bar and dried to form a dry film thickness of 1 μm , and a color

photosensitive layer was produced. In this manner, a photosensitive material for image formation with four different colors was produced.

The compounds that comprise the color photosensitive dispersion are as shown below.

For compound (B):

Triethylene glycol and polyacetal of
2-ethylbutylaldehyde (b)

For compound (C):

2,4-bis(trichloromethyl)-6-(4-styryl phenyl)-s-triazine (c)

For binder (D):

a copolymer condensate resin of phenol and formaldehyde
(weight-average molecular weight: 1000) (d)

For compound (E):

trimethylolethane triacrylate (e)

For the solvent:

ethylene glycol monomethyl ether (MC)

The above-mentioned compounds (b)-(e), (MC), and colorant (a pigment was used) were formulated as shown in the table below (units are on a parts by weight basis). Colored photosensitive dispersion with four different colors of black, cyan, magenta, and yellow were produced, and image forming photosensitive materials with each color were produced.

Formulation chart

		①	②	③	④
		ブラック	シアン	マゼンタ	イエロー
(b)		0.50	0.50	0.50	0.50
(c)		0.25	0.25	0.25	0.25
(d)		3.75	3.75	3.75	3.75
(e)		0.50	0.50	0.50	0.50
(M.C.)		42.8	39.5	40.6	40.6
⑤	カーボンブラック #50 (三菱化成製)	0.99			
⑥	クロムフタルブルー 4GN(チハガイキー製)		0.55		
⑦	クロムフタルレッド (チハガイキー製)			0.68	
⑧	クロムフタルイエロー 8G(チハガイキー製)				0.68

- Key: 1 Black
 2 Cyan
 3 Magenta
 4 Yellow
 5 Colorants (pigments)
 6 Carbon black #50 (product of Mitsubishi Kasei Corp.)
 7 Chromophtal Blue 4GN (product of Ciba-Geigy Corp.)
 8 Chromophtal Red A (product of Ciba-Geigy Corp.)
 9 Chromophtal Yellow 8G (product of Ciba-Geigy Corp.)

Each photosensitive material for image formation of four colors produced was cut into two pieces, and each was processed as described below.

In other words, one of them was stacked with color decomposition positive masks of each color that structure the original, and exposure was performed from the distance of 50 cm for 15 sec by a 3 kW metal halide lamp. Development processing was performed by the SDP-1 (Konica PS plate developer solution:

product of Konica Corp.) solution diluted to 15 times for 30 sec, and color images of four colors were produced.

Heating was not required at the time of image formation for color images of all four colors, and dimensional gap caused by stretching or contraction of the substrate was absent.

Subsequently, the black color image was applied to an art paper, passed between a pair of nip rollers heated to 100°C, and the color image was transferred to the art paper. Then, color image transfer was successively performed for cyan, magenta, and yellow colors, and a color proofing sheet consisting of four colors was produced on the art paper.

Meanwhile, other sheets were stacked with color separation negative masks for each color, image exposures were made for 90 sec from a distance of 50 cm using a metal halide lamp of 3 kW, and exposure was further performed for 15 sec for the entire area without a color separation negative mask. A development was performed using the developer solution described above, and a reversal image of the original was produced.

Subsequently, the black color image was applied to an art paper, passed between a pair of nip rollers heated to 100°C, and the color image was transferred to the art paper. Then, color image transfer was successively performed for cyan, magenta, and yellow colors, and a color proofing sheet comprised of four colors was produced on the art paper.

In this manner, a positive image color proofing sheet can be produced from color decomposition positive masks or color decomposition negative masks using the same image forming photosensitive material but using a development processing as described in Claims 1 and 2 of the present invention.

Application Example 2

In order to produce the color photosensitive layer, photosensitive coating solution with the composition shown below was used, and a color proofing material was produced as in Application Example 1.

For compound (B): [sic]

For compound (B):

The polyacetal described in Application Example 1 (b)

For compound (C):

2,4-bis(trichloromethyl)-6-(4-ethoxynaphth-1-yl)-s-triazine (c')

For binder (D):

the phenol resin described in Application Example 1 (d)

For compound (E):

chalcone obtained from acetophenone and a chalcone made of 4-methoxybenzaldehyde (e')

For solvent:

ethylene glycol monomethyl ether (MC)

Formulation chart

	① ブラック	② シアン	③ マゼンタ	④ イエロー
(b)	0.56	0.56	0.56	0.56
(c)	0.42	0.42	0.42	0.42
(d)	3.33	3.33	3.33	3.33
(e)	0.69	0.69	0.69	0.69
(M)	42.8	39.6	40.6	40.6
⑤ 色 料 (顔 料)	カーボンブラック #50 (三菱化成製) ⑥	0.99		
	クロムフタルブルー 4GN(チバガイキー) ⑦	0.55		
	クロムフタルレッド (チバガイキー) ⑧		0.68	
	クロムフタルイエロー 8G(チバガイキー) ⑨			0.68

- Key: 1 Black
 2 Cyan
 3 Magenta
 4 Yellow
 5 Colorants (pigments)
 6 Carbon black #50 (product of Mitsubishi Kasei Corp.)
 7 Chromophtal Blue 4GN (product of Ciba-Geigy Corp.)
 8 Chromophtal Red A (product of Ciba-Geigy Corp.)
 9 Chromophtal Yellow 8G (product of Ciba-Geigy Corp.)

In this application example, a positive image color proofing sheet can be produced from color decomposition positive mask or color decomposition negative mask using the same image forming photosensitive material using a development processing described in Application Example 1.

Effects of the invention

As explained above, when the transfer image formation method of the present invention is used, either a negative transfer image or positive transfer image can be produced from the original, and at the same time, heating at a high temperature is not required.